Semih Balki - 19010 CS301 - HW2

Problem 1:

(a)

-MergeSort or Heapsort: O(nlogn)

-Max priority queue using get max and percolate down operation k times:

Call build heap is O(n), then call get max and percolate down so the result is O(n + klogk).

(b)

Select kth largest number using rand-select is O(n), then sort the k largest numbers is O(klogk). So, our algorithm takes O(n + klogk).

I would definitely use max-priority queue or order statistics algorithm since their best asymptotic worst-case running time is better than either mergesort or heapsort.

Problem 2:

a)

-If a string is shorter than another and there is no character in the index, consider its value as the smallest.

-Change the base, b = "a-z"

-Compare each index according to the ascii table such as; a: 97 and z: 122 at the ascii table, when we compare 'a' and 'z' value of 'z' is greater than 'a'.

Then following is same as radix sort for integers;

----> do the following for each letter i where i varies from the far right to left.

---->Sort input array according to the ith letter.

b)

"VEYSEL", "EGE", "SELIN", "YASIN" } 0th step
"EGE", "VEYSEL", "SELIN", "YASIN"} 1st step----->Notice that "SELIN" comes before "YASIN"
"VEYSEL", "EGE", "SELIN", "YASIN"}2nd step
"EGE", "SELIN", "VEYSEL", "YASIN"}3rd step
"EGE", "YASIN", "SELIN", "VEYSEL"}4th step

“EGE”, “VEYSEL”, “SELIN”, “YASIN”}5h step
“EGE”, “SELIN”, “YASIN”, “VEYSEL”}6h step

c)

At (b) we can observe that number of steps = length of the longest word.(Lets say k: length of the longest word in the list)
Our base is = “a-z” which is 26.(difference between letter “z” and “a” in the alphabet)
Number of elements is n.
So, the complexity is O(k.(n + 26))